ADDITIONS TO *SECAMONE* R. BR. (ASCLEPIADACEAE: SECAMONOIDEAE) IN AUSTRALIA

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Summary

Four species of *Secamone* R. Br., *S. elliptica* R. Br., *S. lineata* Blume, *S. auriculata* Blume and *S. timoriensis* Decne. are recognised as occurring in Australia. The status of the genus *Toxocarpus* Wight & Arn. is discussed and its placement in the synonymy of *Secamone* is supported.

Introduction

A revision of *Secamone* R. Br. in Australia wherein a single species, *S. elliptica* R. Br. was recognised, was given by Forster and Harold (1989). Although the author was aware at the time of completion of that paper that several taxa of Apocynales from northern Australia possibly belonged to *Secamone* or to other genera, the lack of fertile material prevented unequivocal placement of these specimens either in the Apocynaceae or Asclepiadaceae.

Examination of several fertile collections held at PERTH and a range of material from L has enabled identifications to be made of this material. This has resulted in the recognition of three additional taxa of *Secamone* for Australia. Two of these taxa were transferred to *Toxocarpus* Wight & Arn. by Decaisne (1844) and Boerlage (1890) after being originally described as species of *Secamone* (Blume 1826). The third species, *S. timoriensis*, was originally described as a species of *Secamone* (Decaisne 1844), but the name has subsequently not been used.

Toxocarpus has been maintained as distinct from *Secamone* by a number of authors (e.g. Decaisne 1844; Tsiang 1939; Bakhuizen van den Brink 1950) primarily on the basis of the elongated style-head of *Toxocarpus* as opposed to the captitate to obtuse style-head of *Secamone*. Style-head elongation would appear to be a trivial character upon which to distinguish genera within the Asclepiadaceae, as it is possible for the style-head to vary from depressed-globose to capitate or even elongate-rostrate, within different populations or subspecies of the same species, e.g. some species of *Hoya* and *Marsdenia*. When other characters are enumerated for species of *Secamone s. str.* and *Toxocarpus s. str.* (Decaisne 1844), there are no further characters whereby the two genera can be maintained as distinct. Hence the placement of *Toxocarpus* in the synonymy of *Secamone* as a section by Schumann (1897) is supported here.

Over sixty species of *Toxocarpus* (Tsiang 1939) have been described from Asia and Malesia and the group is in need of critical study. Many of the earlier names of authors such as Blume and Decaisne do not seem to have been subsequently applied to taxa and the group is poorly collected. Variation within species, as with most Asclepiadaceae, further complicates the situation and it is likely that there are considerably fewer, widespread and variable taxa than the large number of published epithets would indicate. However many more collections are required of these Malesian taxa before their taxonomy can be reviewed.

Four species of *Toxocarpus* were described from New Guinea by Schlechter (1914). I have not been able to locate any type material of these taxa as the holotypes at B were destroyed in World War 2 (B. Leuenberger, pers. comm.), however the possibility of isotype material in other European herbaria cannot be ruled out at this stage. As a result the possibility of conspecificity with the Australian and Javan taxa cannot be determined at present. On the basis of the herbarium material seen from Australia and Java, *T. cyclocephalus* Markgraf (isotype at BRI) would appear to be endemic to New Guinea; however, the status of the taxa described by Schlechter (1914) is unclear. The present identifications of the Australian material are based on overall similarity with the Javan material on inflorescence and floral morphology and in particular leaf venation where the collections are sterile. The names used in this treatment are the earliest valid names applicable.

The inclusion of these three additional taxa for Australia does not require any additions to the generic description for *Secamone* (Forster & Harold 1989), but as bibliographic information for *Toxocarpus* was not given in that account, this has been added here.

Taxonomic Treatment

Secamone R. Br., Prodr. 464 (1810).

Refer to Forster & Harold, Austrobaileya 3: 69–78 (1989) for typification, a generic description and bibliographic material.

Toxocarpus Wight & Arn. in Wight, Contrib. bot. India (1834); *Secamone* section *Toxocarpus* (Wight & Arn.) K. Schum. in Engl. & Prantl, Nat. Pflanzenfam. 4(2): 263 (1897). **Type**: *T. kleinii* Wight & Arn., lecto, *fide* Tsiang, Sunyatsenia 4: 66 (1939).
Decne. in DC., Prodr. 8: 504–506 1844); Benth. in Benth. & J.D. Hook., Gen. pl. 2: 505 (1876); J.D. Hook., Fl. Brit. India 4: 13–15 (1885); Tsiang, Sunyatsenia 4: 65–87 (1939).

Goniostemma Wight, Contrib. bot. India 62 (1834). **Type**: *G. acuminatum* Wight
Decne. in DC., Prodr. 8: 504 (1844).

Schistocodon Schauer, Nov. Acta Acad. Nat. Cur. 19, Suppl. 1: 362 (1843); *Toxocarpus* section *Schistocodon* (Schauer) Tsiang, Sunyatsenia 4: 66 (1939). **Type**: *S. meyenii* Schauer
Decne. in DC., Prodr. 8: 677 (1844).

Genianthus J.D. Hook., Fl. Brit. India 4: 15 (1885). **Type**: not designated.

Rhynchostigma Benth. in Benth. & J.D. Hook., Gen. pl. 2: 771 (1876); *Toxocarpus* section *Rhychostigma* (Benth.) Tsiang, Sunyatsenia 4: 76 (1939). **Type**: *Rhychostigma racemosum* Benth., lecto, *fide* Bullock, Kew Bull. 15: 194 (1961).
Benth., Hook. Icon. pl. 12: 77–78 (1876).

Key to sections present in Australia

1. Style-head not greatly exceeding anthers, obtuse to capitate ..... **Secamone**
   Style-head greatly exceeding anthers, conical-elongate
   ..... **Toxocarpus** (Wight & Arn.) K. Schum.

Floral descriptions are based on collections from Java and New Guinea, supplemented by fertile Australian material where available. Indumentum cover is described using the terminology of Hewson (1988), except that 'scattered' is used instead of 'isolated'.

Key to the species of *Secamone* in Australia

1. Leaf lamina membranous and without extrafloral nectaries at base; WA, NT, QLD, NSW ..... 1. **S. elliptica**
   Leaf lamina coriaceous and with extrafloral nectaries at base 2

2. Secondary venation prominently raised below; extrafloral nectaries 30–40 at lamina base; QLD ..... 2. **S. auriculata**
   Secondary venation discernible, but not prominently raised below; extrafloral nectaries 2–8 at lamina base 3

3. Leaf lamina with 13–16 secondary veins per side of midrib; QLD .. 3. **S. lineata**
   Leaf lamina with 6–9 secondary veins per side of midrib; WA 4. **S. timoriensis**

1. Secamone elliptica R. Br.

See Forster & Harold, Austrobaileya 3: 70–72 (1989) for typification details, a description and illustrations.

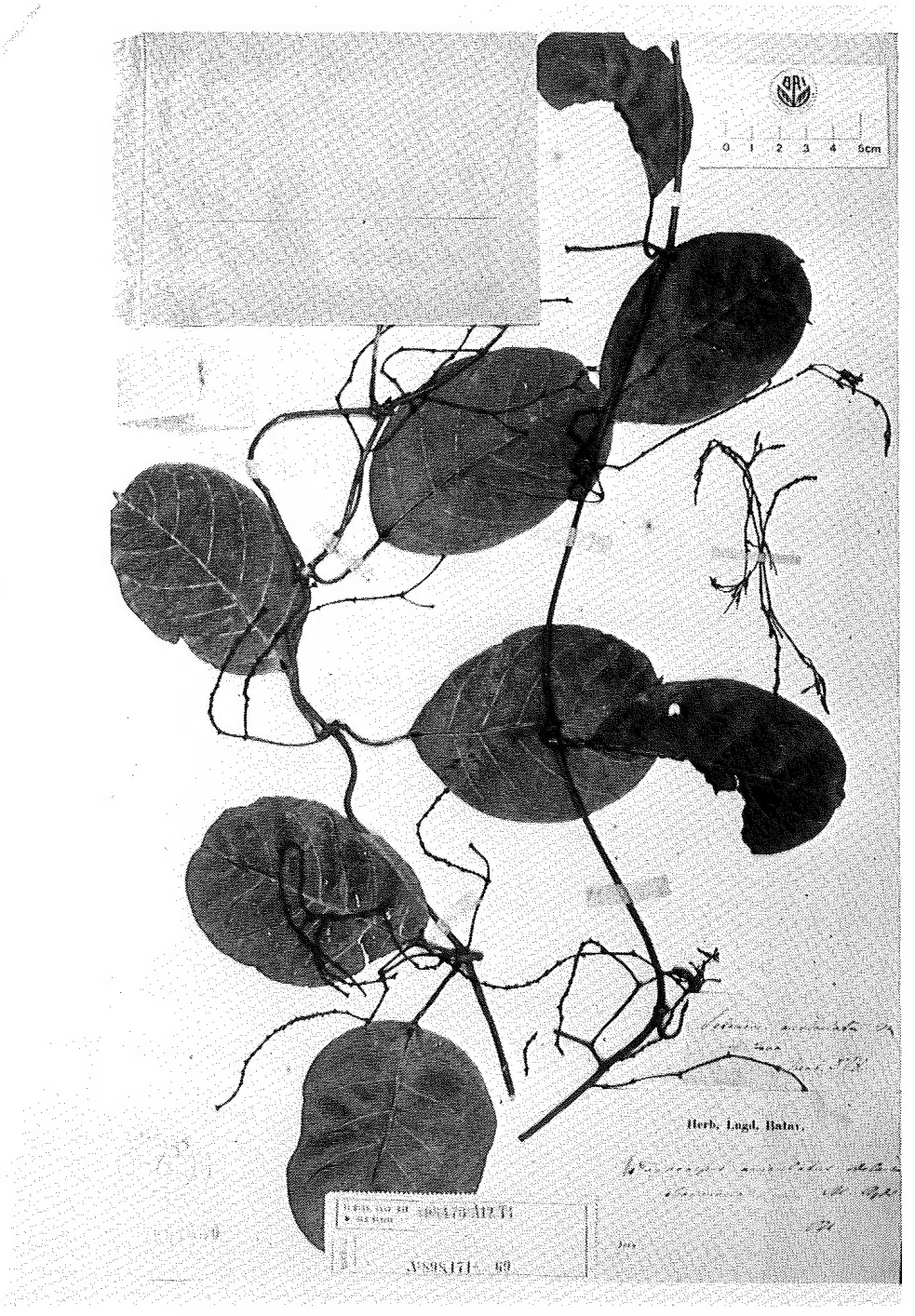

Fig. 1. *Secamone auriculata*: representative sheet of holotype series (L898171-69).

2. Secamone auriculata Blume, Bijdr. 1051 (1826); *Toxocarpus auriculatus* (Blume) Decne. in DC., Prodr. 8: 505 (1844). **Type:** Java, Blume (holo: L898171-67, L898171-70, L898171-69).
Backer & Bakhuizen van den Brink, Fl. Java 2: 255 (1965).

Vine to several metres, latex white. Stems cylindrical, up to 2 mm diameter, glabrous or with sparse to dense brown indumentum when young, becoming lenticellate with age; internodes up to 11 cm long. Leaves petiolate; lamina elliptic, up to 15 cm long and 10 cm wide, discolorous; above dark green, venation obscure, with scattered brown indumentum; below pale green, secondary veins 6 per side of midrib, tertiary venation obscure, with sparse brown indumentum particularly on veins; tip mucronate; base cuneate; petiole grooved along top, 28–31 mm long, 1–1.5 mm wide, with short sparse indumentum; extrafloral nectaries 30–40 at lamina base and extending to 3 mm up lamina midrib. Cyme with many fascicles, up to 16 cm long; peduncle up to 3 cm long and c. 1 mm wide, with scattered indumentum; bracts lanceolate-ovate, c. 1 mm long and 0.75 mm wide, with scattered indumentum. Flowers rotate, c. 2 mm long, 9–10 mm wide; pedicels c. 11 mm long and 0.5 mm wide, with scattered to sparse brown indumentum. Sepals lanceolate-ovate, c. 2 mm long and 1 mm wide, with sparse indumentum. Corolla probably cream; tube c. 1 mm long and 3 mm diameter; lobes lanceolate, 8–11 mm long and c. 1.2 mm wide, glabrous. Staminal corona c. 1.2 mm diameter; each lobe erect, recurved, narrowly linear, slightly broadened at top, c. 0.8 mm long and 0.3 mm wide. Staminal column c. 1 mm long and 0.8 mm diameter; anther appendages lanceolate-ovate, 0.8–1 mm long, 0.5–0.6 mm diameter; slit between anther wings 0.2–0.3 mm long. Style-head conical-elongate, 0.8–1 mm long, 0.5–0.6 mm diameter. Pollinarium 0.27–0.28 mm long, 0.14–0.21 mm wide; pollinia narrow-oblong, c. 0.16 mm long and 0.07 mm wide; corpusculum triangular, 0.06–0.07 mm long, 0.07–0.08 mm wide; caudicles linear, c. 0.05 mm long and 0.01 mm wide. Follicles and seed not seen. **Fig. 1.**

Specimens examined: Java. [L898171-75] (L); [L898171-71] (L); [L898171-73] (L). **Australia. Queensland.** COOK DISTRICT: Moa Is, Torres Strait, 10°11′S, 142°16′E, *Budworth* 1020 (BRI).

Distribution and habitat: Recorded from Java and from Torres Strait, Australia. The Moa Island plants are probably from a vineforest community.

Notes: The collection of *Budworth* 1020 is sterile; however, vegetatively it is a close match for the type material of *S. auriculata* and is quite dissimilar to the other Australian taxa. The pollinaria of this species are different to those of the other species and to those illustrated by Tsiang (1939), as the caudicles are well developed and the junction between the two pollinia attached to each caudicle is indistinct, if indeed it exists at all. However other floral features of *S. auriculata* fit the concept of *Secamone* as applied herein. As the material dissected was very old and fragmentary, further fresh or spirit material is required before any decisions on the generic placement of this species can be resolved.

Conservation status: Further field work is required to adequately assess the size of the population of this species in Australia. An appropriate conservation coding at this stage is 2K +, using the system developed by Briggs and Leigh (1988).

3. Secamone timoriensis Decne. in DC, Prodr. 8: 502 (1844). **Type:** Timor, *Riedle* (iso: P, *n.v.*, photo BRI!).

Vine to several metres, latex white. Stems cylindrical, up to 2 mm diameter, with dense red indumentum in 2 lines spiralling up the stem; internodes up to 13 cm long. Leaves petiolate; lamina elliptic to elliptic-obovate, up to 9 cm long and 4.5 cm wide, discolorous; above glossy dark green, venation obscure, with scattered to dense indumentum; below pale green, secondary veins 7–9 per side of midrib, tertiary venation reticulate, with dense indumentum, particularly on veins; tip mucronate; base rounded; petiole grooved along top, 13–15 mm long and c. 1 mm wide, with dense red indumentum; extrafloral nectaries 2–8 at lamina base. Cyme with up to 10 fascicles, up to 5 cm long; peduncle 1–4 mm long and 1 mm diameter, splitting immediately into 2 branches, with dense red indumentum; bracts lanceolate to elliptic-ovate, 1.3–2 mm long, 0.7–1 mm wide, with dense red indumentum. Flowers campanulate, 4–7 mm long, 7–10 mm diameter; pedicels 1.5–2 mm long and c. 0.25 mm diameter, with dense red indumentum. Sepals lanceolate-ovate, 2.2–3 mm long and c. 1.5 mm wide, slightly overlapping, with sparse

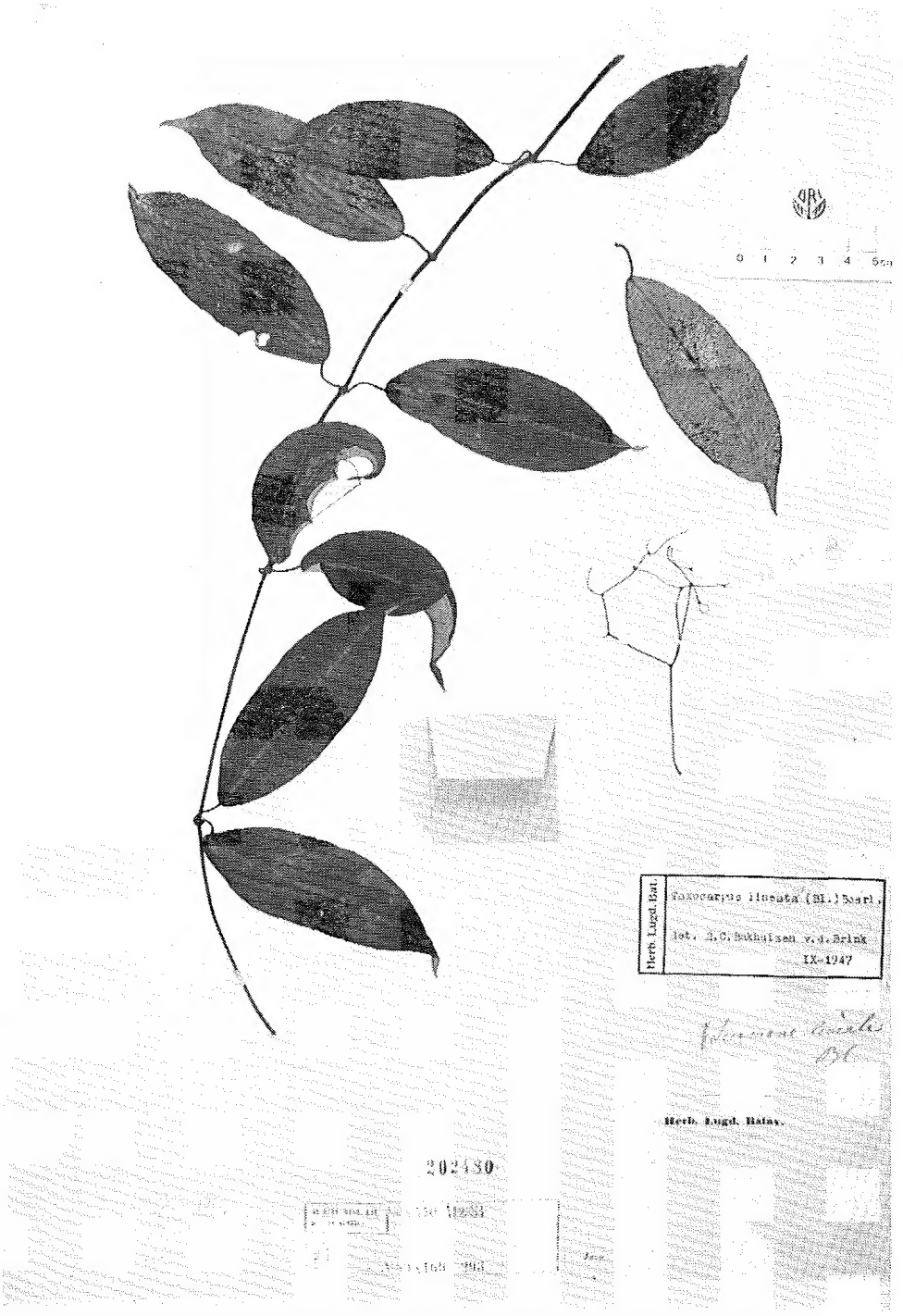

Fig. 2. *Secamone lineata*: representative sheet of holotype series (L898169-297).

to dense red indumentum externally; bases of sinuses with 1 or 2 glands. Corolla yellow; tube 2–3 mm long, 2.5–3 mm diameter, externally glabrous, internally with sparse indumentum in throat; lobes lanceolate, twisted to right in bud, 4.6–6 mm long and c. 2 mm wide, glabrous. Staminal corona c. 1.5 mm long and 1.5 mm diameter; each lobe attached to bottom of staminal column, lanceolate, c. 1.5 mm long and 0.75 mm wide, truncate at top. Staminal column 1.3–1.5 mm long, 1–1.3 mm diameter; anther appendage triangular to obtuse, 0.25–0.5 mm long, 0.25–0.3 mm wide; slit between anther wings c. 0.9–1 mm long. Style-head conical-elongate, exceeding anthers, 2.4–2.5 mm long and c. 0.8 mm wide at base. Ovaries c. 0.6 mm long and 0.5 mm wide. Pollinarium c. 0.25 mm long and 0.15 mm wide; pollinia 0.13–0.15 mm long, 0.06–0.08 mm wide; corpusculum c. 0.08 mm long and 0.06 mm wide. Follicles fusiform, c. 11 cm long and 8 mm wide, glabrous; seed not seen.

Specimens examined: Irian Jaya. Cycloop Mtns, road Hollandia – Sentani, Lake Sentani, Jun 1961, *van Royen & Sleumer* 5804 (L). **Australia. Western Australia.** Lone Dingo, Mitchell Plateau, 14°35′S, 125°45′E, Feb 1979, *Beard* 8447 (PERTH); Surveyors Ck road, turnoff between Mitchell Plateau Mining Camp and Port Warrender road, 14°39′S, 125°42′E, May 1981, *Tracey* 14002 (BRI,QRS); Forest Ck near Drysdale River, 14°39′S, 126°57′E, Aug 1975, *George* 14123 (PERTH); Mertens Falls (Little Falls) on road to Mitchell Falls, Mitchell Plateau, 14°48′S, 125°42′E, May 1981, *Tracey* 14008 (BRI,QRS); Glider Gorge, Carson Escarpment, Drysdale N.P., 14°49′S, 126°49′E, Aug 1975, *George* 13664 (PERTH); Worriga Gorge, Drysdale River N.P., 15°02′S, 126°40′E, Aug 1975, *George* 14023 (PERTH); 3.7 km NW of Mt Daglish, 16°15′S, 124°56′E, Jun 1987, *Keighery & Alford* 1378 (PERTH); Gorge of Barker River, NW of Mt Mattau, Mt Hart Stn, 16°46′S, 124°55′E, Jun 1987, *Edinger* s.n. (PERTH); Walsh Pt, Port Warrender, Admiralty Gulf, Jan 1980, *Kenneally* 7820 (PERTH); Mongonai Ck, 24 km S of Carson River Crossing, Gibb River – Kalumburu Mission road, Jun 1976, *Beauglehole* 52087 (PERTH); Cape Clujo, Jul 1973, *Wilson* 11286 (PERTH).

Distribution and habitat: Recorded from Timor and Western Australia, Australia. Plants grow as lianes in vine thickets.

Notes: Of the Australian material cited, only *Beard* 8447 and *Kenneally* 7820 are fertile and there is considerable vegetative variation between the other collections. Further fertile collections are required to determine whether more than one taxon is involved.

Conservation status: This species seems to be quite common in the Kimberleys in Western Australia. No conservation coding is required.

4. Secamone lineata Blume, Bijdr. 2: 1050 (1826); *Toxocarpus lineatus* (Blume) Boerl., Handl. fl. Ned. Ind. 2: 436 (1890). **Type:** Java, *Blume* (holo: L898169-297, L898169-293).
Decne. in DC., Prodr. 8: 503 (1844); Backer & Bakhuizen van den Brink, Fl. Java 2: 256 (1965).

Woody vine to several metres, latex white. Stems cylindrical, up to 2 mm diameter, glabrous or with scattered indumentum when young, becoming lenticellate when old; internodes up to 13 cm long. Leaves petiolate; lamina lanceolate-ovate to elliptic, up to 12.5 cm long and 4.5 cm wide, discolorous; above glossy, dark green, venation obscure, glabrous; below pale green, secondary veins 13–16 per side of midrib, tertiary venation obscure, glabrous or with scattered indumentum on veins; tip acuminate; base rounded; petiole grooved along top, 11–13 mm long and c. 0.5 mm wide, glabrous or with scattered indumentum; extrafloral nectaries 4–5 at lamina base. Flower rotate, c. 3 mm long, 13–14 mm diameter; pedicels 12–14 mm long and c. 0.3 mm diameter, glabrous. Sepals lanceolate, c. 1.4 mm long and 0.7 mm wide, with sparse indumentum. Corolla probably yellow; tube c. 1.5 mm long and 2.5 mm diameter; lobes lanceolate, c. 7 mm long and 1.5 mm wide, glabrous. Staminal corona c. 2 mm diameter, comprising 5 lobes adnate to staminal column; each lobe subulate, c. 2 mm long and 0.4 mm wide. Staminal column c. 1.3 mm long and 1 mm wide; anther appendages truncate, c. 0.1 mm wide; slit between anther wings c. 0.4 mm long. Style-head conical-elongate, c. 1.4 mm long and 0.3 mm diameter. Pollinarium c. 0.27 mm long and 0.27 mm wide; pollinia c. 0.07 mm long and 0.07 mm wide; corpusculum c. 0.08 mm long and 0.05 mm wide. Follicles and seed not seen. **Fig. 2.**

Specimens examined: Sumatra. [L898169-294] (L). **Java.** [L898169-296] (L); ditto, [L898169-295] (L); ditto, [L898169-299] (L); ditto, [L908337-284] (L); Tepoes Lantjer, Tjadas Malang, Feb 1918, *Winckel* 70β (L); Res. *Preanger*, Oct 1896, *Koorders* 26066β (L); Res. Preanger, Tjigenteng, Jan 1897, *Koorders* 26355β (L). **Australia. Queensland.** Cook District: 2.7 km past Lockerbie Homestead site on road to Cape York, 10°47′S, 142°29′E, Jun 1988, *Forster* 4418 & *Liddle* (BRI,MEL,QRS); Lake Patricia, Weipa, 12°39′S, 141°50′E, Apr 1988, *Forster* 4077 & *Liddle* (BRI); Lamond Hill, 12°43′S, 143°18′E, Apr 1988, *Forster* 4213 & *Liddle* (BRI); Garraway Creek rockpiles, 12°45′S, 143°11′E, Apr 1988, *Forster* 4240 & *Liddle* (BRI); McIlwraith Range, 1962, *Webb & Tracey* 7981 (BRI).

Distribution and habitat: Recorded from Sumatra, Java and far north Cape York Peninsula, Queensland. The Australian populations grow in rainforests and vineforests on a variety of soil types.

Notes: Sterile plants may be recognised partly by the prominent lenticels on the stems which are uncommon in other Australian Asclepiadaceae. There is also a tendency for the stems to layer on contact with the soil. There is no available fertile Australian material of this taxon and the floral description is mainly based on *Koorders* 26355β and [L898169–294]. Despite extensive searching during February and March 1990 in the wet season at Lockerbie Scrub and Weipa where this species is very common I was not able to locate flowering material or observe evidence of past flowering.

Conservation status: Although this species has been rarely collected in Australia, it is not uncommon on far north Cape York Peninsula and thus does not require a conservation coding.

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